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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,688	12/16/2003	Masayuki Endo	60188-730	3573

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EXAMINER

SULLIVAN, CALEEN O

ART UNIT	PAPER NUMBER
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1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/735,688	Applicant(s) ENDO ET AL.	
	Examiner Caleen O. Sullivan	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11, 13, 15, 16, 19, 20 and 22-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11, 13, 15, 16, 19, 20 and 22-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/09/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's amendments and arguments, filed 01/30/2007, with respect to the rejection(s) of claim(s) 1-5 and 9-22 under 35 USC 103 (a) have been fully considered. Based on the amendments and arguments, the rejection has been withdrawn. However, the amendments have caused the Examiner to present new ground(s) of rejection below.
2. Examiner has noted that the dependence of claim 19 has been corrected. The rejection of claim 19 under 35 USC 112 second paragraph has been withdrawn.
3. Examiner has noted that the correction required in the specification has not been addressed. The disclosure is still objected to because of the following informalities: Reference No. 32 in Figure 3B is not mentioned in the description. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 13, 16, 27-29 and 34-37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 34-37 are stated to depend from claims 27-29; however they are unclear in light of the claims from which they depend. Examiner has interpreted that claims 34 and 36 depend directly or indirectly from claim 33, that claim 37 depends from claim 32 and that claim 35 is a redundant claim. Examiner has used that interpretation in the rejections that follow.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 11, 13, 15-16, 19, 23-30 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elian ('240) in view of Kawamura ('146) and further in view of Grabowski ('548).

Elian ('240) discloses a process for forming a resist pattern using a chemically amplified resist material. Although the process states that the method is for forming a negative resist structure, Elian ('240) also discusses positive chemically amplified resists and methods of forming resist patterns with such material, which mirrors the process Elian ('240) discloses for the negative resist material; therefore it is inherent that a positive chemically amplified resist material can be used in the process. (See, para 0004, 0007, 0008).

The process disclosed in Elian ('240) includes the first step of applying a chemically amplified resist material to the substrate, which contains a polymer that changes polarity when exposed to an acid. (See, para 0014). Next, Elian ('240) discloses that the resist is dried and then

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exposed to light, X-rays, electron beams or ion beams. The source of light for the exposure is UV between 1-400nm, and UV light typically uses light sources such as those listed in claims 15, 19 and 38. (See, para 0039). Then Eliau ('240) discloses, the resist is heated and developed with an aqueous-alkaline developer solution. (See, para 0014). This disclosure meets the limitation of claims 11, 13 and 16 where a resist film of a positive chemically amplified resist material is formed and then a resist pattern is formed by developing the resist film with developer after irradiating through a mask.

Eliu ('240) goes on to disclose that a sulfonic acid is liberated during the process. (See, para 0017). Eliu ('240) also discloses that the resist used in the process contains a polymer that under acid catalysis will release a sulfonic acid and preferably contains a tert-butyl ester group as well. (See, para 0031-0033). This disclosure meets the limitations of claims 11 and 13, where the chemically amplified resist material includes a base polymer for generating sulfonic acid through irradiation with light and the limitation of claims 13 and 16, where the resist includes a dissolution inhibitor for generating sulfonic acid.

However, Eliu ('240) fails to disclose that the base polymer is poly (styrenesulfonic acid-t-butyl ester) or poly (styrenesulfonic acid-2-methyl-adamantyl) or that the dissolution inhibitor is styrenesulfonic acid-t-butyl ester or styrenesulfonic acid-2-methyl-2-adamantyl ester. Moreover, Eliu ('240) fails to disclose that the light component from the irradiation source enters the resist film at the Brewster's Angle.

Kawamura ('146) discloses such base polymers and dissolutions inhibitors that are used in positive tone radiation sensitive layers. Kawamura ('146) discloses a radiation sensitive layer that is used in forming a radiation sensitive printing plate precursor. The polymer of the positive working photosensitive layer, preferably includes a sulfonic acid ester group as a functional group. (See, col.5, 5-27). This disclosure meets the limitation of claims 27-29.

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Kawamura ('146) further discloses the make up of the binder, which includes a polymer that decomposes when acted upon by heat or acid to become water or alkali soluble, includes sulfonic acid ester polymers. (See, col.17, 50-65). Kawamura ('146) also gives specific examples of sulfonic acid ester compounds that can comprise the polymer. (See, col.18, 1p-1 to 1p-8). This disclosure meets the limitations of claims 23-26.

Still, Elian ('240) in view of Kawamura ('146) fails to disclose that the light component from the irradiation source enters the resist film at the Brewster's Angle.

Grabowski ('548) discloses directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches the limitation of claim 20 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the teachings of Elian ('240) in view of the teachings of Kawamura ('146) further in view of the teachings in Grabowski ('548) because Kawamura ('146) teaches that one can form a resist film of positive chemically amplified resist material that includes a sulfonic acid ester polymer as a base polymer and styrenesulfonic acid t-butyl ester as a dissolution inhibitor to release sulfonic acid upon irradiation with light, and Grabowski ('548) teaches that exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

9. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayase ('695) in view of Grabowski ('548). Hayase ('695) discloses a resist for forming patterns that is sensitive to UV rays and a pattern formation method using the resist. The resist comprises an acid

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generating compound that generates an acid when exposed to radiation, a compound that has an acid decomposable substituent group and a carboxylic acid. (See, col.2, 53-59). The resist can comprise a carboxylic acid that can mix uniformly with the other components of the resist such as formic acid, as recited in claim 20. In the method disclosed in Hayase ('695), the resist layer is coated on a substrate and then dried to form a film of the resist. (See, col.10, 39-50). Next, Hayase ('695) discloses that UV rays emitted from KrF, ArF, XeF or XeCl excimer laser, which are some of the exposing light sources recited in claim 22, or an ionizing radiation such electron beams or X-rays are applied on the resist film through a mask that has the desired pattern. (See, col.10, 51-65). Then the resist film is heated, whereby the reaction between the acid-decomposable compound and the acid generator occurs. Lastly Hayase ('695) discloses that the resist film is developed with an alkali aqueous solution to form the desired resist pattern.

However, Hayase ('695) fails to disclose the limitation of claim 20 where the light component from the irradiation source enters the resist film at the Brewster's Angle.

Grabowski ('548) discloses directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches the limitation in claim 20 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the pattern formation method disclosed in Hayase ('695) with the irradiation step disclosed in Grabowski ('548) because Grabowski ('548) teaches that exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

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10. Claims 31-34, 36-37 and 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breyta ('220) in view of Grabowski ('548).

Breyta ('220) discloses a radiation sensitive resist composition that includes an acid generator a polymer and an acid labile group. Breyta ('220) discloses that the acid labile compound is preferably chemically bonded to the polymer, and upon exposure to acid the acid labile component undergoes a polarity change, which results in dissolution differentiation. (See, col.2, 8-10). The acid labile compound is preferably a compound having an acid cleavable ester group. (See, col.2, 10-11). This disclosure in Breyta ('220) meets the limitation of claim 32 and 33 where the chemically amplified resist material includes a dissolution inhibitor that is an ester of acrylic acid, methacrylic acid or α -trifluoromethylacrylic acid.

Breyta ('220) discloses that preferred acid labile groups are ester groups such as t-butyl and α -methyl benzyl esters of carboxylic acids. (See, col.2, 53-56). Breyta ('220) further disclose that the acid labile compound is chemically bonded to the polymer, which can include vinyl polymers such as poly (acrylic acid) and poly (methacrylic acid). (See, col.3, 9-25). This disclosure meets the limitation of claims 31 and 33 where the chemically amplified resist material includes a base polymer that is an ester of polyacrylic acid, polymethacrylic acid or poly (α -trifluoromethylacrylic acid). Breyta ('220) disclose in an Example 2 that one of the components of the resist composition is a copolymer of t-butyl acrylate, which is recited in claim 34 and 36-37. (See, col.5, 15-20).

Although Breyta ('220) does not explicitly disclose that a carboxylic acid is generated, it is inherent that a carboxylic acid is generated because the acid labile compound, which will be released on exposure to an acid, is an ester of a carboxylic acid.

Breyta ('220) goes on to disclose that the resist material can be used in a process to form a resist film and pattern. The film is first coated onto a substrate and then heated to remove solvent

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from the film. (See, col.3, 51-55). Next, Breyta ('220) discloses that the film is image wise exposed to a low dose of radiation or electron beam radiation preferably DUV with suitable radiation sources including excimer laser, which meets the limitations of claims 39-41, and upon exposure acid is generated. (See, col.3, 56-64).

After the exposure Breyta ('220) discloses that the film is heated again and the acid cleavable ester group, which is an ester of a carboxylic acid is cleaved and the polymer becomes soluble in alkaline developer. (See, col.3, 65-4,9). The last step in the process disclosed in Breyta ('220) is the development of the image in the film using an aqueous base solvent to produce a positive tone image. This disclosure in Breyta ('220) teaches the limitation of claims 31-33 where a resist film of a positive chemically amplified resist material is formed, and then a pattern is developed with a developer after irradiating through a mask.

However, Breyta ('220) fails to disclose the limitation of claims 31-33 where the light component from the irradiation source enters the resist film at the Brewster's Angle.

Grabowski ('548) discloses directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches the limitation in claim 20 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the pattern formation method disclosed in Breyta ('220) with the irradiation step disclosed in Grabowski ('548) because Grabowski ('548) teaches that exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

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11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

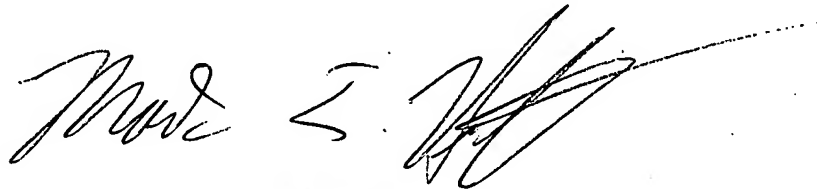
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caleen O. Sullivan whose telephone number is 571-272-6569. The examiner can normally be reached Monday-Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

COS, 3/21/2007



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